Unit B Changes in Motion

The conditions were perfect. The snow pack was stable and the avalanche-control staff gave them the green light to hike up the upper basin in search of untracked powder. They were up to the challenge and packed all the right gear—avalanche beacons, probes, a small shovel, and lots of enthusiasm. The hike up the mountain beyond the last chair lift wasn't easy, but the payoff made it all worthwhile. What a rush!

In these conditions, some call snowboarding *shredding* or *screaming* and refer to this kind of powder as *hero snow* because it makes you feel like you are flying down the slope. Clearly, these adventurers have expended a great deal of energy to experience this unique and exhilarating form of motion. They have also put effort into doing this safely by taking all the necessary safety precautions.

In this unit you will investigate the reasons for changes in motion. Investigations will lead to new insights as you develop an understanding of the relationships among forces, motion, and momentum. You will explore the concepts in the context of the design of safety devices used in sports equipment and in highway transportation systems.

What You Will Cover

Chapter 1: Describing Motion

1.1 Average Speed
1.2 Identifying and Solving Problems with New Technologies
1.3 Average Velocity
1.4 Graphical Description of Uniform Motion
1.5 Graphical Description of Accelerated Motion
1.6 Calculating Displacement During Accelerated Motion
1.7 Determining Stopping Distance
1.8 A Closer Look at Braking
1.9 Newton's First Law of Motion

Chapter 2: Collisions

2.1 Momentum
2.2 Change in Momentum
2.3 Impulse
2.4 A Closer Look at Forces and Newton's Third Law
2.5 Conservation of Momentum
2.6 Designing a Helmet